



## **McNett – Aquamira™ Water Bottle and Filter**

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### **Device Information**

The Aquamira™ water bottle and filter is a handheld sports type squeeze bottle. The bottle has a capacity of 0.65 L (22 oz). The bottle contains a filter cartridge using an activated carbon block depth filter that sits inside the top of the sports bottle between the bottle and the drink spout. The activated carbon filter is a 6 cm long hollow-core cylinder with a 0.8 cm thick wall. Water flows from outside through the filter wall into the hollow inside and out the drink spout. The filter reportedly has an approximate pore size of 2 µm. Information provided on the bottle and packaging claims this device removes sediment, organic debris, and chlorine taste as well as 99.9% (3-log) *Cryptosporidium* oocysts and *Giardia* cysts. Directions for use require the user to fill the bottle with water to within 4 cm from the top, insert the activated carbon filter, replace the cap and squeeze to produce water. Prior to the first use the filter must be flushed with one bottle of water to remove filter particle fines. For storage, the manufacturer recommends the bottle and filter to air dry completely and store dry filter in a plastic bag.

### **Effectiveness Against Microbial Pathogens**

No data was received showing the effectiveness of this product with respect to the U.S. Environmental Protection Agency (USEPA) Guide Standard Protocol for Testing Microbiological Water Purifiers (reference 1). The theory and practice of depth filtration has been widely studied and there has been significant research conducted on activated carbon block filtration (reference 2). In the absence of data specific to this device tested using reference 1, and based on general knowledge of depth and carbon block filtration, this device should be capable of consistently reducing *Giardia* cysts and *Cryptosporidium* oocysts to the required minimum log reductions stated in reference 1 (i.e., 3-log) when used as directed. It is not expected to consistently reduce bacteria (6-log) and viruses (4-log). Based on general depth and carbon block filtration information, the Aquamira water bottle and filter is assigned one √ for the reduction of *Giardia* cysts and *Cryptosporidium* oocysts and an X for bacteria and virus reduction (for an explanation of the rating checks [click here](#)).

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™ Aquamira is a registered trademark of McNETT Corporation, Bellingham, WA. Use of trademarked names does not imply endorsement by the U.S. Army, but is intended only in identification of a specific product.

**Table. Expected Performance Against Microbial Pathogens.**

<b>Microbial Pathogen Type</b>	<b>Expected Disinfection Capability</b>	<b>Evaluation Rating</b>	<b>Primary Pathogen Reduction Mechanism</b>
Bacteria	> 6-log	X	-
Viruses	> 4-log	X	-
<i>Giardia</i> cysts	> 3-log	√	size exclusion
<i>Cryptosporidium</i> oocysts	> 3-log	√	size exclusion

#### Production Rate and Capacity

Inherent to the production rate and capacity of filtration devices is the quality of the raw water source. Because it is a squeeze bottle, the actual production rate is dependent on the user. The production capacity of the device is stated to be approximately 130 L. However, production capacity will vary widely with raw water quality (i.e., turbidity).

#### Cleaning, Replacement, and End of Life Indicator

This device cannot be backwashed to remove sediment from the filter. When the device becomes unusable due to decreased production rate, the clogged filter must be replaced. The bottle is dishwasher safe or can be hand washed. For practical purposes, the filter cartridges are not cleanable. The device contains no end of life indicator short of filter clogging.

#### Weight and Size

Dry weight	150 grams
Size (height x diameter)	24 cm x 7 cm

#### Cost

Bottle with filter	\$20.00
Replacement filter	\$11.00



### Device Evaluation

No data was received that challenged the Aquamira water bottle and filter against reference 1. General research on depth filtration indicates that this device should be capable of consistently reducing *Giardia* cysts and *Cryptosporidium* oocysts. This device is not likely capable of consistently reducing bacteria and viruses. Additional treatment is necessary to remove bacteria and viruses such as adding a disinfectant (e.g., chlorine, iodine, chlorine dioxide) to the bottle prior to filtering. The activated carbon should remove tastes and odors. This device, like all filters with small pore sizes, is highly affected by turbid (cloudy) waters. Since the device is not able to be backwashed to remove accumulated particulates, once clogged, the filter must be replaced. There is no indicator of process failure or end of device useful life.

### Advantages

- Expected to consistently provide adequate protection from *Giardia* cysts and *Cryptosporidium* oocysts, although device-specific testing data using the USEPA protocol is not available.
- No wait time prior to consumption.
- Simple and effective.
- Provides taste and odor reduction.

### Disadvantages

- Not expected to be consistently effective against bacteria and viruses.
- Reduced production capacity when using high turbidity water.
- Not backwashable.
- No real-time indicator of process failure.

### References

1. USEPA, 1989. Guide Standard and Protocol for Testing Microbiological Water Purifiers. *Federal Register*. 54:34067.
2. U.S. Army Center for Health Promotion and Preventive Medicine. (2005). *Technical Information Paper; Filtration in the Use of Individual Water Purification Devices*, Aberdeen Proving Ground, MD.

